Docket No. 218230US0X

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF :

Monika OSWALD, et al. : EXAMINER: STEIN

SERIAL NO: 10/045,049 :

FILED: JANUARY 15, 2002 : GROUP ART UNIT: 1775

FOR: A LAYER OBTAINED FROM AN AQUEOUS DISPERSION CONTAINING A SILICON/TITANIUM MIXED OXIDE POWDER PREPARED BY FLAME-HYDROLYSIS

APPEAL BRIEF

COMMISSIONER FOR PATENTS
ALEXANDRIA, VA 22313-1450

SIR:

This is an appeal of the Final Rejection of Claims 9-13 and 16-17 and in the above-identified application set forth in the Official Action mailed July 21, 2003 and maintained in the Advisory Action mailed November 7, 2003.

I. Real Party of Interest

The real party of interest is Degussa AG, located in Duesseldorf, Germany by virtue of the assignment recorded in the U.S. Patent and Trademark Office on February 14, 2002 at reel 013044, frame 0160.

II. Related Appeals and Interferences

Appellants, Appellants' legal representative and their assignee are not aware of any appeals or interferences which will directly affect or be directly affected by or having a bearing on the Board's decision in this appeal.

III. Status of Claims

Claims 9-33 are the only claims pending in the above-identified application.

Claims 9-13 and 16-17 are appealed herein. Applicants note that the status of Claims 16-17 has not been indicated in the Advisory Action (paper number 17); however, for sake of completion these claims are included in the present appeal.

Claims 14-15 have been indicated as being allowable, but are objected to for being dependent on a rejected base claim and are appealed herein.

Claims 18-20 and 31-33 have been withdrawn from consideration as being drawn to a non-elected invention. However, in the Advisory Action (paper number 17), Claims 31-33 has also been indicated as being allowed.

Claims 21-30 are allowed.

IV. Status of Amendments filed under 37 C.F.R. §1.116

The Amendment Under 37 C.F.R. §1.116 filed October 21, 2003 has been entered and considered not to be persuasive to the allowance of the claims over the prior art under 35 U.S.C. §102(b) and 35 U.S.C. §103(a).

V. Summary of Invention

Coating layers for substrates (e.g., borosilicate glass, silica glass, glass ceramics, low coefficient of expansion materials, and other inorganic substrates) have been known to

contain silicon dioxide and titanium dioxide. (page 1, lines 8-9) These layers are typically obtained by a sol-gel process in which silicon and titanium alkoxides is deliberately hydrolyzed and subsequently polymerized in an organic solvent (e.g., alcohol) and water. (page 1, lines 9-12) During polymerization a sol is initially produced and then, with increasing cross-linking of the polymer units, a gel. (page 1, lines 12-14) Alternatively, the titanium component may be added in the form of a dioxide rather than an alkoxide, while a portion of the silicon component may also be present in a dioxide form. (page 1, lines 17-20). The sol can be applied to a substrate by dip-coating and subsequent thermally treating and sintering (page 1, lines 14-16).

However, a problem exists with the aforementioned process in that the gel contains a high proportion of solvent, which leads to a high degree of shrinkage and the formation of cracks during the extremely slow and controlled drying. (page 1, lines 21-23) Moreover, it is difficult to form mechanically stable and thick layers with a low proportion of solids in the gel. (page 1, lines 23-25)

Consequently, in the present invention, Appellants have provided a layer that addresses the aforementioned problems that exist with conventional silicon dioxide and titanium dioxide containing layers, as well as methods of making the same. (page 1, lines 26-31)

Present Claims 9-17 relate to a layer that is obtained by thermal treatment from an aqueous dispersion applied to a substrate where the dispersion contains a silicon/titanium mixed oxide powder having a specific titanium dioxide content. Claims 18-20 relate to a process of preparing the layer of Claim 9. Claims 21-30 relate to a layer that is obtained by thermal treatment from an aqueous dispersion applied to a substrate where the dispersion contains a mixture of powders each at a specific BET surface area and in a specific ratio one another. Claims 31-33 relate to a process of preparing the layer of Claim 21.

VI. Issues

Whether Claim 9 is anticipated within the meaning of 35 U.S.C. §102(b) over U.S. Patent No. 5,672,330 (Hartmann et al).

Whether Claims 10-13 [and 16-17[1]] are obvious within the meaning of 35 U.S.C. §103(a) over U.S. Patent No. 5,672,330 (Hartmann et al).

Appellants note that with the entry of the amendment filed on October 21, 2003, the indefiniteness rejection of Claims 11 and 12 have been obviated. However, for sake of completion, Appellants comment on these claims herein.

VII. Grouping of the Claims

For this issue on appeal, the claims stand or fall together.

VIII. Arguments

Claim 9 stands rejected under 35 U.S.C. §102(b) as unpatentable over U.S. Patent No. 5,672,330 (Hartmann et al) and Claims 10-13 [and 16-17] stand rejected under 35 U.S.C. §103(a) as unpatentable over U.S. Patent No. 5,672,330 (Hartmann et al). These rejections are untenable and should not be sustained.

The present invention provides, in part, a layer obtained by thermal treatment from an aqueous dispersion applied to a substrate, the dispersion containing a silicon/titanium mixed oxide powder prepared by flame hydrolysis and the titanium dioxide content of the powder is between 2 and 20 wt.% (see Claim 9).

Appellants note that Hartmann et al fail to disclose or suggest the presently claimed

[1] Claims 16 and 17 are included in the discussion of the rejections over Hartmann et al since the Examiner has not indicated their status in the Advisory Action and they were indicated as rejected in paper number 14.

layer as set forth in Claim 9 and Claims 10-20, which are dependent therefrom. Specifically, Hartmann et al fail to disclose or suggest a silicon/titanium mixed oxide powder containing a titanium dioxide content of the powder is between 2 and 20 wt.%. In fact, Hartmann et al specifically disclose a "flame-hydrolytically produced titanium dioxide mixed oxide with a BET surface of 10 to 150 m^2/g which contains 1 to 30% by weight aluminum oxide or 1 to 30% by weight silicon dioxide" (column 1, lines 38-42). From this disclosure, it is clear that the layer produced in Hartmann et al, preferably, has a TiO_2 content of 70 to 99 wt% (see column 1, lines 38-42), and as such a layer containing 2 to 20 wt% of TiO_2 is neither anticipated nor obvious in view of this disclosure. Accordingly, Appellants submit that Claim 9, and Claims 10-20 which are dependent therefrom, are free of the art of record and should be allowed.

The Examiner has maintained this rejection, in part, of Claims 9-13 and 16-17 over the disclosure of Hartmann et al. In maintaining this ground of rejection, the Examiner points to the table in column 1 at lines 47-60 of Hartmann et al and asserts that the titanium dioxide mixed oxide disclosed in the reference contains 20-90% rutile. However, this assertion by the Examiner appears to be a misinterpretation of the disclosure of Hartmann et al.

As stated above, Hartmann et al specifically disclose a "flame-hydrolytically produced titanium dioxide mixed oxide with a BET surface of 10 to 150 m^2/g which contains 1 to 30% by weight aluminum oxide or 1 to 30% by weight silicon dioxide" (column 1, lines 38-42). From this disclosure, it is clear that Hartmann et al has a TiO_2 content of 70 to 99 wt% (see column 1, lines 38-42). Further, Appellants note the following based on the table in column 1 of Hartmann et al to which the Examiner refers.

The Examiner asserts that the titanium dioxide mixed oxide disclosed in Hartmann et al contains 20-90% rutile. Appellants do not disagree that the rutile content is 20-90%; however, Appellants note that this percentage is a percentage of rutile within the titanium

dioxide and is *not* a weight percentage within the total composition as interpreted by the Examiner. Flame hydrolytically produced titanium dioxide usually exists in two different crystalline forms: rutile and anatase[2]. Therefore, when the rutile content is 20-90% (as in Hartmann et al), the remaining 10-80% of the titanium dioxide is anatase. Evidence of this fact is clearly apparent by reference to the very table referred to by the Examiner in which each of Al_2O_3, SiO_2, Annealing loss, and Chloride content are defined as "% by weight", while Rutile content is defined as "%".

For the Office's convenience, the table appearing in column 1 of Hartmann et al is reproduced below:

Al_2O_3 content (% by weight)	1-30
SiO_2 content (% by weight)	1-30
Specific surface (m^2/g)	10-150
Primary (unagglomerated) particle size (nm)	5-100
Stamping density (g/l)	50-400
Annealing loss (2 hours at 1000°C) (% by weight)	0.5-5
Chloride content (% by weight)	10<1
Rutile content (%)	20-90

Throughout the specification, Hartmann et al clearly specify that their titanium dioxide mixed oxide comprises either "Al_2O_3/TiO_2 mixed oxide ***or*** SiO_2/TiO_2 mixed oxide" (emphasis added, see column 2, lines 3-4). When referring to the table in column 1 (above),

[2] See attached copies of: (a) page 9, U.S.D.O.E., Aqueous Electrochemical Mechanisms in Actinide Residue Processing (Final Report); (b) AEROXIDE® TiO_2 P25 product description (Degussa); and (c) Kim et al, *Advanced Engineering Materials,* **(2002)** 4:7, 494-496.

then, it is clear that Al_2O_3 and SiO_2 are listed as *alternatives* in the titanium dioxide mixed oxide. Therefore, from the numbers in the table given in column 1 (see above), the following composition is obtained:

Al_2O_3 ***or*** SiO_2	1 to 30 wt%
Chloride	10 to <1 wt%
Balance:	
TiO_2	***at least 60 wt%***

Therefore, in the appropriate interpretation of the disclosure of Hartmann et al, the titanium dioxide mixed oxide disclosed in Hartmann et al contains *at least 60 wt% of titanium dioxide*.

The standard for determining anticipation requires that the reference "must teach every element of the claim" (MPEP §2131). The titanium dioxide content of the mixed powder of the presently claimed invention ranges from 2 to 20 wt%. Hartmann et al fail to meet this standard and, as such, fails to anticipate the presently claimed invention.

Not only do Hartmann et al fail to meet the standard for determining anticipation as defined in MPEP §2131, this reference can not even support a *prima facie* case of obviousness as the requirement for at least 60 wt% titanium dioxide in the titanium dioxide mixed oxide disclosed in Hartmann et al would teach the artisan away from the claimed content of 2 to 20 wt%. The Examiner is reminded that MPEP § 2141.02 states: "prior art must be considered in its entirety, including disclosures that teach away from the claims". When this teaching away is considered, Hartmann et al clearly fails to anticipate and/or render obvious the present invention.

Furthermore, MPEP §2142 states: "To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation... to modify the reference... Second, there must be a reasonable expectation of success. Finally, the prior art reference... must teach or suggest all the claim limitations." First, at no point do Hartmann et al provide any suggestion or motivation to modify their disclosure to embrace a titanium dioxide content as low as 20wt%. Second, Hartmann et al fail to appreciate the advantages flowing from the claimed titanium dioxide content as clearly evidenced by the Examples appearing on page 6-10 of the present specification. And, finally, Hartmann et al clearly fail to teach or suggest all the claim limitations, specifically a titanium dioxide content of 2 to 20wt%. Therefore, Hartmann et al cannot even support a prima facie case of obviousness over Claims 9-13 and 16-17.

For argument sake, if the Examiner's apparent interpretation of the recited rutile content being a weight percentage (wt%) were followed, the table is still incapable of anticipating and/or rendering obvious the present invention.

For example, if the table were read as the Examiner appears to interpret it without reference to the remainder of the Hartmann et al disclosure, this table only recites the inclusion of Al_2O_3, SiO_2, chloride, and rutile as components in the titanium dioxide mixed oxide. Specifically, the maximum concentrations of the Al_2O_3, SiO_2, and chloride are: 30 wt% Al_2O_3, 30 wt% SiO_2, and 10 wt% chloride (total= 70 wt%). Therefore, at the maximum content of these components, the smallest concentration of rutile that may be present is 30 wt%. Again, even under this erroneous interpretation, there is no disclosure or suggestion of a titanium dioxide content of 2 to 20 wt% as claimed.

This example can be further played out when recognizing that Hartmann et al clearly state that Al_2O_3 and SiO_2 are *alternatives*. In this scenario, the maximum concentrations of the Al_2O_3, SiO_2, and chloride are: 30 wt% of either Al_2O_3 *or* SiO_2, and 10 wt% chloride

(total= 40 wt%). Accordingly, in this scenario, the maximum of these components, the smallest concentration of rutile that may be present is 60 wt%. Once again, even under this erroneous interpretation, there is no disclosure or suggestion of a titanium dioxide content of 2 to 20 wt% as claimed.

In view of the foregoing exemplary scenarios, it is clear that a titanium dioxide content as low as 20 wt% is impossible, even when Hartmann et al is interpreted as the Examiner has alleged.

Accordingly, it is respectfully requested that the anticipation rejection of Claim 9 over Hartmann et al and the obviousness rejection of Claims 10-13 and 16-17 over Hartmann et al be REVERSED.

It is unclear from the Advisory Action whether the rejection of Claims 11 and 12 under 35 U.S.C. §112, second paragraph, remains following entry of the amendment filed on October 21, 2003. Accordingly, Appellants offer the following comments to ensure a complete record on appeal.

Appellants wish to acknowledge the Examiner for bringing their attention to the typographical error in Claims 11 and 12 in which "pm" was inadvertently inserted in place of the appropriate "μm." Appellants have amended Claims 11, 12, 23, and 24 to provide the proper units. Support for this amendment is provided by page 4, lines 1-3 of the English translation.

Accordingly, Appellants request that this ground of rejection be REVERSED.

Appellants note that MPEP §821.04 states:

> ...if applicant elects claims directed to the product, and a product claim is subsequently found allowable, withdrawn process claims which depend from

or otherwise include all the limitations of the allowable product claim will be rejoined.

Appellants respectfully submit that should the claims that correspond to the elected group (Claims 9-17 and 21-30) be found allowable, non-elected process claims (Claims 18-20 and 31-33) that depend from the elected composition claims should be rejoined. Appellants wish to thank the Examiner for the indication that these claims would be rejoined (see paper number 14, page 2, paragraph 3).

IX. CONCLUSION

For the above reasons, Claim 9 is not unpatentable under 35 U.S.C. §102(b) over U.S. Patent No. 5,672,330 (Hartmann et al); Claims 10-13 [and 16-17] are not unpatentable under 35 U.S.C. §103(a) over U.S. Patent No. 5,672,330 (Hartmann et al); and Claims 11 and 12 are not indefinite under 35 U.S.C. §112, second paragraph. Therefore, the Examiner's rejections should be REVERSED.

Respectfully submitted,

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Attachments: Appendix